Boulder Creek Restoration Project

Vegetation Report

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June 15, 2017

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Introduction

The vegetation resource is an important part of this project because it indirectly provides for multiple resource benefits such as clean water, wildlife habitat and recreation. Local communities value the forest and keeping it healthy because it draws visitors who spend their money in the area and the proposed restoration activities such as culvert replacements, road maintenance and logging related jobs would benefit the local economy.

The vegetation resource is part of the purpose and need in this project and issues related to the vegetation complex have created alternatives explained in the environmental analysis (EA). This analysis focuses on predicted effects of each alternative to the vegetation composition and structure and how each alternative would maintain or improve resistance[1] and resilience[2] of the forest vegetation to future disturbances and stressors (e.g. insects, diseases, wildfire, droughts etc.). Although the analysis is centered on the conifer tree component, it is recognized that associated layers of vegetation are important parts of the plant communities in the area.

The maintenance and restoration of a healthy and resilient forest ecosystem is our primary concern in the BCRP area. A healthy forest would possess a balance or mosaic of properties including the composition, structure, growth and resiliency needed to meet the multiple resource objectives for the project area. The forest vegetation across the BCRP area is constantly changing because of the interaction of plant succession and the influence of both human and natural disturbances. At the landscape scale, the forest vegetation of northern Idaho typically displays diversity in both composition and structure. This diversity is attributable to climate, geology, and disturbance patterns (insects, disease, fire history and extreme weather events). These elements combine to create some of the most varied and productive forest communities found in the Inland Northwest. The most dominant vegetative feature of the northern Idaho forests are conifer trees. The major tree species growing in this area include lodgepole pine, grand fir, Douglas-fir, western hemlock, western red cedar, western larch, western white pine, ponderosa pine, subalpine fir, and Engelmann spruce. The higher elevations of the BCRP support scattered populations of whitebark pine.

Relevant Laws, Regulations, and Policy

Regulatory Framework

Regulatory constraints applying to the management of forest vegetation include the Idaho State Forest Practices Acts, Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), National Forest Management Act of 1976 (NFMA), Idaho Panhandle National Forests Forest Plan (USDA 2015) and Forest Service policy.

- *RPA states, "It is the policy of Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans."*

[1] The term resistance refers to the ability of the forest trees to survive disturbances and/or stressors such as fire, insects/diseases, drought and other potential climate change impacts.
[2] Resilience is used to describe the ability of the forest vegetation community, mostly the trees, to withstand disturbances without the loss of structure or function.

- *The 1976 National Forest Management Act directs that Forest Plans will be developed which specify guidelines to identify the suitability of lands for resource management; provide for the diversity of plant and animal communities based on the suitability and capability of land areas to meet multiple-use objectives; where appropriate, to the degree practicable, preserve the diversity of tree species similar to that existing in the project area; insure that timber will be harvested from National Forest System Lands only where soil, slope, or other watershed conditions will not be irreversibly damaged; the lands can be adequately restocked within five years after harvest; protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water where harvests are likely to seriously and adversely affect water conditions and fish habitat; and the harvesting system used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.*
- *Any cut designed to regenerate an even-aged stand of timber must be determined to be appropriate to meet the objectives and requirements of the land management plan and, in the case of clearcutting, is the optimum method; has had an interdisciplinary review of impacts and the cuts are consistent with the multiple use of the general area; will be shaped and blended, to the extent practicable, with the natural terrain; meets established, suitable size limits; and is carried out in a manner consistent with protection of soil, watershed, fish, wildlife, recreation, esthetic resources, and the regeneration of the timber resource.*
- *NFMA amended RPA and requires that stands of trees shall generally have reached the culmination of mean annual increment of growth prior to harvest, but this does not preclude the use of sound silvicultural systems such as thinning and other stand improvement measures; it also allows salvage or sanitation harvest following fire, windthrow, or other catastrophe or within stands in imminent danger of insect and disease attack.*

Forest Service policy directs land managers to:

- *Use only silvicultural practices that are best suited to the land management objectives for the area. Consider all resources, as directed in the appropriate forest plan.*
- *Prescribe treatments that are practical in terms of cost of preparation, administration, transportation systems, and logging methods.*
- *Monitor practices, using procedures specified in forest plans to ensure objectives are met.*
- *Before scheduling stands for regeneration harvest, ensure, based on literature, research, or local experience, that stands to be managed for timber production can be adequately restocked within five years of final harvest. Five years after final harvest means five years after clearcutting, final overstory removal in shelterwood cutting, the seed tree removal cut in seed tree cutting or after selection cutting.*
- *Perform all silvicultural activities in the most cost effective manner consistent with resource management objectives.*

Forest Service policy further directs that:

- *The size of openings created by even-aged silvicultural methods will normally be 40 acres or less. The creation of larger openings will require public review and Regional Forester approval.*
- *Management activities will promote programs that provide a sustained yield of forest products consistent with the multiple-use goals established in Regional Guides and the Forest Plan.*
- *Timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished primarily by maintaining stand vigor and diversity of plant communities and tree species.*

- *Protection of timber stands from insect and disease problems will center around silvicultural treatments prescribed for timber management activities.*

Idaho Panhandle National Forests Forest Plan Monitoring Reports (USDA 2012, 2010, 2007 and 2005) document the Idaho Panhandle National Forests' record of restocking harvested lands, determining timberland suitability and following Regional guidelines regarding public notification, environmental analysis and the creation of openings greater than 40 acres created by even-aged silvicultural systems. These monitoring reports also serve to summarize and document the level of ongoing insect and disease hazard, the acres treated and the corresponding timber volume sold on the Idaho Panhandle National Forests over the past 10 years.

Land and Resource Management Plan

The Idaho Panhandle National Forests Land and Resource Management Plan (LRMP) provides forest wide goals and desired conditions that are directly applicable to forest vegetation management in the BCRP area. The goal for vegetation management on the Idaho Panhandle National Forests is:

GOAL-VEG-01. Plant communities are trending toward the desired conditions for composition, structure, patterns, and processes. The ecological integrity of the communities is high and they exhibit resistance and resiliency to natural and man-caused disturbances and stressors, including climate change.

Desired Conditions

The desired conditions for the forest vegetation on the Idaho Panhandle National Forests are:

FW-DC-VEG-01. More of the forest is dominated by western white pine, ponderosa pine, western larch, and whitebark pine. Conversely, less of the forest is dominated by grand fir, western hemlock, western redcedar, Douglas-fir, lodgepole pine, and subalpine fir. More hardwood trees occur in the forest such as quaking aspen, black cottonwood, and paper birch.

FW-DC-VEG-02. More of the forest is dominated by stands occurring in the seedling/sapling size class and less of the forest is dominated by stands that occur in the small and medium size classes.

FW-DC-VEG-03. The amount of old growth increases at the forestwide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old growth stands that contain substantial amounts (i.e., 30 percent or more of the total species composition) of one or more of the following tree species: ponderosa pine, western larch, western white pine, and whitebark pine. Old growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old growth stands (or patches of multiple contiguous old growth stands) increase and they are well-distributed across the five Geographic Areas on the Forest.

FW-DC-VEG-04. Tree densities and the number of canopy layers within stands are generally decreased.

FW-DC-VEG-05. The pattern of forest conditions across the landscapes consists of a range of patch sizes that have a diversity of successional stages, densities, and compositions. Formerly extensive, homogenous patches of forests that are dominated by species and size classes that are very susceptible to disturbance agents have been diversified. Generally, there is an increase in the size of forest patches that are dominated by trees in the seedling/sapling size class, as well as in the large size class. There is a decrease in the size of the patches that are dominated by trees in the small and medium size classes.

FW-DC-VEG-06. Root disease fungi, such as *Armillaria* and *Phellinus*, are killing fewer trees as the composition of the forests trends toward less susceptible tree species such as western larch, ponderosa pine, and western white pine. Forest insects, such as Douglas-fir bark beetle, mountain and western pine beetles, fir engraver beetle, and the western spruce budworm, are generally causing less tree mortality. Impacts from the non-native fungus that causes the white pine blister rust disease are reduced as the abundance of rust-resistant western white pine and whitebark pine increases.

FW-DC-VEG-07. Snags occur throughout the forest in an uneven pattern, provide a diversity of habitats for wildlife species, and contribute to the sustainability of snag dependent species. Snag numbers, sizes, and species vary by biophysical setting and dominance group. Table 1 displays the desired range of snag densities. Over time, the number of large-diameter snags (20 inches in DBH or greater) increases in all biophysical settings.

FW-DC-VEG-08. Down wood occurs throughout the forest in various amounts, sizes, species, and stages of decay. The larger down wood (i.e., coarse woody debris) provides habitat for wildlife species and other organisms, as well as serving important functions for soil productivity.

Management Areas

The 2015 forest plan for the Idaho Panhandle National Forests provides overarching guidance for managing the lands within the national forest boundaries. These lands are divided into management areas, which specify standards and guidelines for managing the resources in each area. We have designed the BCRP to achieve direction in the forest plan that also complements the goals of the KVRI Collaborative Forest Landscape Restoration Proposal (CFLRP). The following management area direction from the forest plan is applicable to this project area. The proposed action would take place in MA 5 and 6.

The BCRP boundary totals 40,612 acres and overlaps the following different Management Areas or (MA's):

- MA 2b Eligible Wild and Scenic River – 35 acres (0.01%),
- MA 4a Hunt Girl Research Natural Area – 1,425 acres (3%),
- MA 5 Backcountry – 23,384 acres (58%),
- MA 6 General Forest – 15,717 acres (39%)
- and 51 acres of private land (0.01%).

Other Guidance or Recommendations used in this analysis

Other guidance documents related to implementing the proposed action and vegetation management can be found in the EA under their respective resource topic. For instance, details about prescribed burning are described in the fire and fuels section.

Topics and Issues Addressed in This Analysis

Purpose and Need

The full purpose and need for this project can be found in the EA. The vegetation resource is a primary part of the purpose and need for this project because vegetation cover and its overall health and resilience are indirectly related to various resources such as clean water, wildlife habitat, forest fuel accumulations and a desirable place to recreate. Local communities value forest health and resilience because these forested ecosystems tend to draw visitors who spend their time and money in the local economic area. The proposed restoration treatments (silvicultural prescriptions and prescribed burning) are designed to create and maintain healthy and resilient forests and associated activities such as culvert replacements, road maintenance, and logging related jobs are expected to indirectly benefit the local economy.

The purpose and need for the vegetation resources of the BCRP is to:

Maintain and improve forest landscape resiliency by providing for tree species, stocking levels, and landscape patterns that better resist insects, disease, and stand-replacing wildfire(s). Needs that are specific to the BCRP include:

- Restoration of white pine on habitat types that historically supported the species
- Reduction in acres of moderate and high hazard lodgepole pine stands
- Maintenance and restoration of ponderosa pine and western larch on habitat types that historically supported these species
- Maintenance and restoration of dry-site old growth stands
- Increased patch size of forest openings (seedling/sapling)
- Decreased patch size of immature forests (small and medium)
- Conserve existing whitebark pine populations and enhance opportunities for restoration
- Reduction in the amount and the potential threat of noxious weeds along road sides, trails, recreation areas and near sensitive plant habitat.
- Retention or restoration of ecological conditions and processes that sustain the habitats currently or potentially occupied by sensitive plant species.

Issues

Please refer to the EA for a full description of issues and alternative development. The vegetation resource is at the root of the issue because some of the public controversy is over how and where we should go about treating the vegetation in the BCRP. Two action alternatives have been fully developed to contrast the difference between treating vegetation in roadless areas.

Resource Indicators and Measures

The following principle issues and their respective indicators in Table 1 are used to compare alternatives and track how well they meet the purpose and need with respect to the vegetation resource. They also are used to measure whether the proposed actions trend the issues toward or away from the Forest Plan - desired conditions as described above.

Table 1. Issues and indicators

Principle Issue	Principle Issue Indicators
Forest Composition	• Acres trended toward dominance of long-lived seral[3] species (i.e., ponderosa pine, western larch, whitebark pine and western white pine) that better resist insects, diseases and fire.
Forest Structure	• Acres of moderate and high hazard lodgepole stands converted to early successional forests. • Acres of health, vigor and resilience improved, or maintained, through stocking control. • Increased patch size of forest openings (seedling/sapling) • Maintenance and restoration of dry-site old growth stands

Methodology – Spatial and Temporal Context for Analysis

The cumulative effects area for the forest vegetation resource is the Boulder Creek watershed boundary which is the same as the BCRP project area. The project area is 40,630 acres in size and given the historic sizes of stand replacement wildfire events that occurred in north Idaho, this analysis scale is appropriate. Stand replacement wildfire events that historically occurred in north Idaho were often tens of thousands of acres in size and these fires were the most significant events in shaping the forests (USDA 2000; Zack and Morgan 1994). Therefore, when discussing historical forest conditions and disturbances, a fairly large area similar to this project area is necessary. The analysis area is made up of ever-changing, dynamic ecosystems; however, current vegetative conditions can be summarized. The timber stands are the primary units for collecting, examining, and summarizing tree information in the Timber Stands Management Record System (TSMRS). This information, as well as the objectives described under the purpose and need section of this document and the forest plan, were used to evaluate the BCRP area's existing condition for forest vegetation and to compare it to the landscape and desired forest stand conditions. A silvicultural forester identified forest stand treatment needs based on insect and disease activity, potential and existing vegetation conditions, and desired stand conditions identified in the purpose and need for this project area.

This analysis uses a step-down approach to compare and contrast vegetative conditions at the larger Columbia Basin level down to the BCRP level. Following the findings of the Interior Columbia Basin Ecosystem Management Project (ICBEMP), Northern Region Overview, and the NZGA, the forests of North Idaho and the Kootenai River Basin are not healthy, and some sort of active management is essential to restoring them. Forest composition and structural changes at the local level reflect these findings.

The spatial and temporal boundaries for the vegetation resource in the BCRP are always changing over time and follow successional pathways. Succession is defined as the sequential process of long-term plant community change and development that occurs following a disturbance such as fire(s), wind throw events, insect disease outbreaks or stand manipulations through harvesting and thinning the vegetation. As described by Smith and Fischer (1997), these successional pathways can be very complex. The rate of recovery for vegetation after a disturbance is also a function of site productivity and the habitat type where that forest stand may be growing in the landscape.

[3] A seral community (or sere) is an intermediate stage found in ecological succession in an ecosystem advancing towards its climax community.

Northern Idaho's forests present a complex array of composition and structure. Cooper et al (1991) distinguished forty six habitat types (potential climax community types) containing numerous conifer species, various hardwoods, and a multitude of shrubs in Idaho north of the Salmon River. These forests are dynamic as well as diverse. They vary constantly in response to climatic changes, geological events, species immigration, and patterns of human use (Johnson and others 1994).

Information Sources

Information that was used to describe the affected environment and environmental consequences comes from a variety of sources. Historical conditions and ecological processes were assessed using information from large and mid-scale ecosystem assessments and other relevant research. Information on existing conditions of National Forest System lands for habitat types, forest cover types, forest structural stage, origin, past harvest activity, etc. are based primarily on corporate data housed in Forest Service Oracle relational databases including the Timber Stand Management Record System (TSMRS) and FSVeg (Field Sampled Vegetation). During the planning of this project, field visits were made to all the areas proposed for treatment as well as many other stands in the project area that were not included into the proposed action for treatments.

Affected Environment

Existing Condition

The existing condition, health, resilience and diversity of the current vegetation resource in the BCRP is a function of past disturbances.

Following the findings of the Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin (ICBEMP), Northern Region Overview, and the North Zone Geographic Area (NZGA), the forests of North Idaho and the Kootenai River Basin are generally not healthy, nor is their health and resilience to external forces expected to improve over time without some sort of active management which would be essential to restoring them. Conditions at the local level reflect these findings.

Prior to European settlement, western white pine was the dominant tree species on about 21 percent of National Forest lands in the Kootenai River Sub-basin. Western larch was the dominant tree species on 19 percent of the historic landscape. Ponderosa pine forest types occupied 9 percent of the landscape. Relative to these historic conditions, western white pine and western larch cover types have declined 94 percent and 50 percent respectively and less than 2 percent of the landscape contains ponderosa pine forest types. Conversely, the amount of area dominated by lodgepole pine has increased 127 percent and by grand fir/western hemlock forest types by over 300 percent (Table 2 and Figure 1). At upper elevations there has been a dramatic conversion of whitebark pine cover type into Engelmann spruce/subalpine fir cover types.

Table 2. Forest Composition: Kootenai Sub-Basin (National Forest)

Composition: Forest Type	PP	WP	WL	DF	GF/WH	WRC	LP	SAF	WBP
Kootenai Historic Forest	9.1%	21.1%	18.9%	7.1%	1.5%	2.9%	7.9%	29.2%	2.3%
Kootenai Current Forest	1.5%	1.3%	9.5%	16.9%	6.1%	7.3%	18.0%	37.5%	1.0%
% Change From Historic	*-84%*	*-94%*	*-50%*	+137%	+315%	+148%	+127%	+29%	*-56%*

The primary factors responsible for the current deviation from historic means and ranges are successful fire suppression resulting in an altered disturbance regime, timber extraction and white pine blister rust (Harvey et al 2008, Neuenschwander et al 1999, Graham 2002). While the effect of these factors on species composition is particularly striking, they have also had major effects on the distribution of structural classes and patch sizes across the landscape.

Relative to historic conditions at the scale of the Kootenai Sub-basin, there has been an overall homogenization and simplification of landscape pattern. The landscape is increasingly aggregated into big patches of medium size trees. There is less variability in internal structure or composition within these patches.

The mean patch size and core area associated with the shrub/seedling/sapling size class has substantially declined and variability will continue to so as the large patches of early-successional vegetation created by the Trapper Peak and the Ball Creek Burns mature. The Kootenai Sub-Basin has experienced a 31 percent decline in old growth relative to historic conditions. The excess in the mature/large size classes approximately balances this decline in old growth.

The dynamic, diverse and altered nature of forests in North Idaho are detailed in the following sections which provide an ecological overview of forest conifer conditions at the very large landscape scale of the Interior Columbia Basin, and step down through several geographic levels to conditions at the stand level. As the geographic areas get smaller, the ecological information becomes more specific.

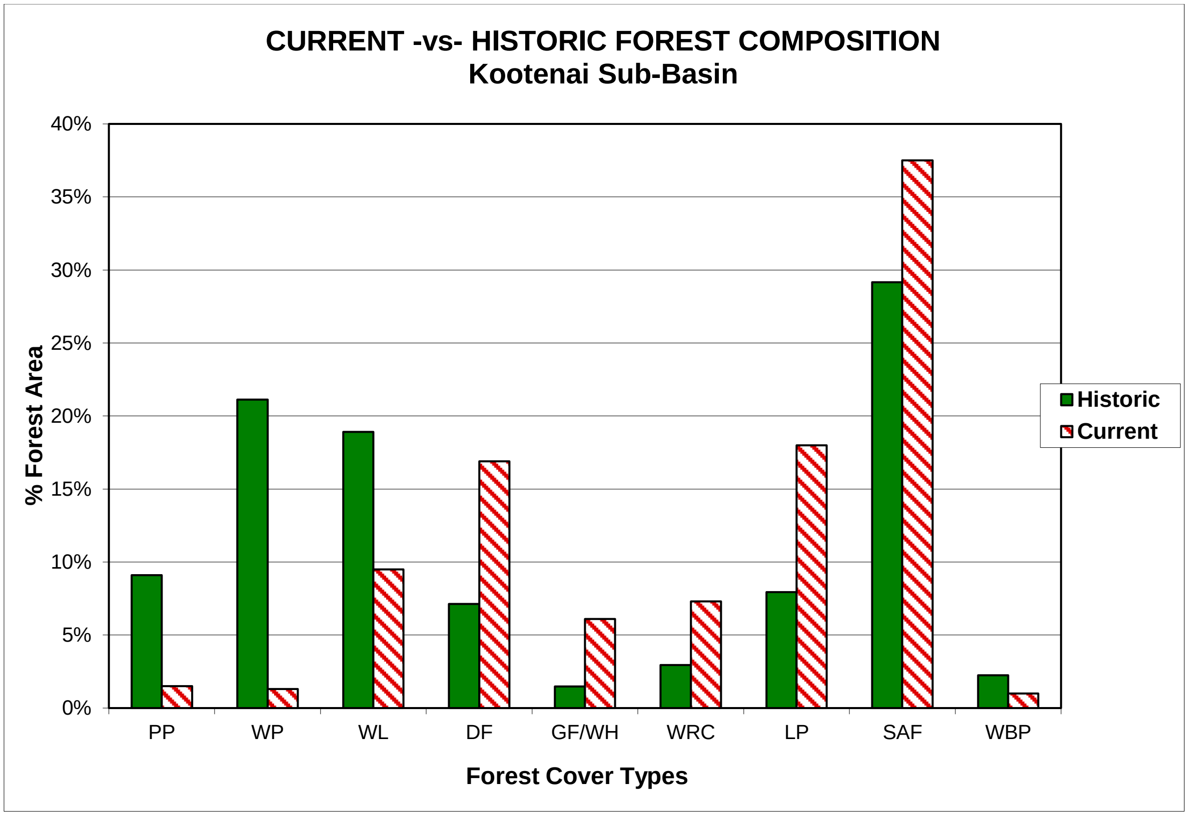


Figure 1. Change in Forest Composition of the Kootenai River sub-basin (USDA 2000).

Columbia River Basin

Findings presented in the ICBEMP show that, throughout the Interior Columbia Basin, disturbances such as fire and insect mortality have played an important role in determining forest tree composition (Quigley and Arbelbide 1997). Within northern Idaho and eastern Washington, the most significant historic natural disturbance was fire. In addition to natural disturbance, the Assessment found that land management activities and introduced pathogens have dramatically altered the species and age composition of trees in the overstory.

Historically, coniferous tree composition in the Interior Columbia Basin was dominated by species such as ponderosa pine, western larch and western white pine. These long-lived tree species were typically established after some form of disturbance and have the potential to occupy a site for 200-300 years. Many of the local disturbances not only initiated these long-lived species, but also maintained them in mature conditions. Stands of these trees were adapted to regenerate in and survive local fire regimes. Other disturbances, such as historic levels of insect populations and wind and winter storm damage, contributed to stand mortality. As trees died, they became fuel wood and over time created conditions for large stand-replacing fires.

Effective fire suppression, the loss of white pine due to the introduced blister rust pathogen, and land management activities such as historic high-grade logging have caused the character of the forests to change. Forests across the Interior Columbia Basin are now dominated by shade-tolerant grand fir, western hemlock and Douglas-fir. These species are more vulnerable to disturbances such as insects, diseases and fires. They are less adapted to fire, drought and natural climatic variability than the species they replaced. The results are more insect and disease activity and higher fire risk.

Northern Region Overview

The Northern Region Overview (USDA 1998) considered and incorporated findings from the ICBEMP and focused on priorities for restoring ecosystem health. Some of the findings of the overview pertinent to vegetative conditions in the stand are:

- Due to the interaction of agents such as blister rust and mountain pine beetle, followed by salvage harvests since the 1930s, over 95 percent of the white pine type has changed to grand fir, Douglas-fir, and western redcedar/western hemlock cover types with an associated change to a largely mid-seral stage structure. Without an effective restoration effort using genetically improved/resistant western white pine stock, paired with an aggressive planting program, further interactions with agents of change will effectively eliminate white pine as a cover type.
- The risk regionally is high for a continued loss of western larch cover type and emergent structure due to the lack of low intensity, periodic disturbance, and the shift toward stand-replacing fire.
- Current structures are typified by mid- to mature age/size classes with relatively few areas in the seedling and sapling structural stage. In northern Idaho, the typical stand structure and composition is multi-layered; comprised primarily of Douglas-fir and grand fir. This is a result of a combination of fire exclusion, selective harvest of large early-seral species, and especially the loss of western white pine. An increase in root disease has correspondingly reduced the productivity and health of forests in northern Idaho in this type as a higher percentage of the most susceptible host species (Douglas-fir and grand fir) exist today.

The Overview findings conclude that there are multiple areas of concern in the Northwest Zone of the Region (which includes the IPNF), but that “this sub region holds the greatest opportunity for vegetation treatments and restoration with timber sales.” The Overview goes on to state, “The timber management (timber harvest) tool best fits with the forest types in northern Idaho and is essential, for example, to achieve the openings needed to restore white pine and larch…”

North Zone Geographic Assessment

Because of the local variation in landscape change throughout the Columbia Basin and the Northern Region, the Idaho Panhandle National Forests (IPNF) began a process to conduct an ecosystem assessment for the northern zone of the IPNF (USDA Forest Service, 2000). The assessment covers three sub basins; Priest River, Pend Oreille, and Kootenai and is called the North Zone Geographic Assessment (NZGA). The purpose for developing the NZGA was to develop a scientifically-based understanding of the processes and interactions occurring in the sub basins so that activities can be developed to promote healthy and resilient ecosystems. The NZGA identifies ecosystem trends and changes in vegetation over the last 100-200 years which are similar to those identified at the scale of the Northern Region and Interior Columbia Basin.

NZGA findings at the Kootenai River Subbasin scale conclude that majority of the terrestrial landscape is low integrity and high risk. The basin is heavily altered from historic conditions and contains both great need and opportunity for large-scale vegetation restoration. Characteristics of the landscape include:

- Current forests are dominated by shade-tolerant, drought-and fire-intolerant species (grand fir, western redcedar, and western hemlock), and short-lived seral species (lodgepole pine and Douglas-fir).
- There is a loss of long-lived seral species such as western larch, western white pine, and ponderosa pine.
- There is a lack of wildfire as a natural disturbance factor.

- It contains large areas of forest types with high probability of major successional change in the next few decades.
- There is an increased risk of fire as a result of fuel accumulations from the changes in forest conditions.
- The forest types are susceptible to heavy mortality from insects and disease.

The NZGA also identified management strategies that could be used for restoration within these low integrity/high risk landscapes. The following is a list of the management objectives from the NZGA that are most relevant to this stand:

- Use both regeneration harvest and prescribed fire to create openings where potentially long-lived seral tree species (ponderosa pine, white pine, and larch) are lacking and implement appropriate silvicultural practices to assure regeneration of these species – including blister rust resistant white pine;
- Lower the risk of large, severe disturbances by:
  - ✓ Restoring potentially long-lived early seral tree species (ponderosa pine, western larch, and blister rust-resistant white pine) on appropriate sites;
  - ✓ Reducing the extent of drought and fire intolerant forest types (grand fir, western hemlock, western redcedar) on sites where they are not well adapted, and are likely to be drought stressed (south aspects, shallow soils, some upland sites);
  - ✓ Reducing the extent of short-lived early seral forest types (Douglas-fir and lodgepole pine) that are at or near pathological rotation age;
- Use commercial thinning, thinning from below, shelter wood with reserves, and prescribed fire to sustain and favor larch and ponderosa pine where they are present, and regenerate them where appropriate;
- In existing young stands, favor potentially long-lived early seral tree species, manage density, and manage blister rust through pre-commercial thinning, pruning, and other appropriate stand tending activities;
- Restore large-scale diversity in landscape pattern by increasing patch size of both early and late successional patches; while providing for a large variety of patch sizes.

Figure 2. View from Black Mountain looking south into the headwaters of Boulder Creek

Forest Disturbances

Disturbance[4] is both a natural and necessary part of forest ecosystems; it is what drives the stages of forest succession and allows trees to grow and recycle (Campbell and Leigel 1996). There are several disturbance agents that can change the structure and composition of forests such as fire, weather, insects, pathogens, and humans. Disturbances are what created the wide range of vegetation in various structural conditions seen throughout the project area today.

Pre-European Settlement

Fire is the major disturbance process that produces vegetation changes in our western ecosystems. It has helped to influence and shape the northern Rocky Mountain forests more than any other single factor since the Pleistocene age (Shiplett and Neuenschwander 1994; Wellner 1970). Fire has burned in every ecosystem and virtually every square meter of the coniferous mountain forests of northern Idaho, western Montana, eastern Washington and adjacent portions of Canada that experience significant dry summer periods when vegetation can sustain wildfires (Zack and Morgan 1994). Fire was responsible for the widespread occurrence and even the existence of western larch, lodgepole pine, and western white pine. Fire maintains ponderosa pine throughout its range at lower elevations and kills ever-invading Douglas-fir and grand fir (Spurr and Barnes 1980). Removing or altering the role of fire produces significant changes in ecosystems. Many ecosystems are regularly recycled by fire; life for many forest species literally begins and ends with fire.

[4] In ecology, a disturbance is a temporary change in average environmental conditions that causes a pronounced change in an ecosystem.

In the discussion that follows, “severity” refers to the amount of damage a fire actually causes and “return interval” refers to how often a particular type of fire occurs. Here is a summary of the types of fires that occur in forested ecosystems:

Low-severity fires – These are nonlethal fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs, and forbs may be burned back to the ground line. These are commonly low-severity surface and understory fires, often (but not always) with short return intervals (few decades).

Mixed-severity fires – These are fires that kill more than 10% but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed-severity fires may be quite variable.

High-severity fires – These are lethal fires that kill 90% or more of the dominant tree canopy. These are often called “stand-replacing” fires and they often burn with high severity. They are commonly (but not always) crown fires. In general (but not always), lethal fires have long return intervals (140-250+ years apart), but affect large areas when they do occur. Local examples of these types of fires would be the Sundance and Trapper Peak fires of 1967 that burned over 80,000 acres in a relatively short time period.

Figure 3. Aerial photo taken in 1933 provides a view of the Boulder Creek headwaters and the aftermath of the 1910 fire.

Based on local fire history data, large high-severity fires burned a majority of the old growth stands in the 1800s and early1900s. The fires burned severely, essentially clearing the landscape and allowing for vast areas of regeneration to lodgepole pine stands. Lodgepole pine is an aggressive pioneer species with the capability of producing a lot of seed after a fire. The new trees grow quickly giving lodgepole pine an advantage to perpetuate after fires (Wheeler and Critchfield 1984). According to historical records, the mid- to late-1800s was also about the same time that the Kootenai sub basin was settled by pioneers. For these reasons, this analysis uses the environment during this time as an historical reference or representative baseline for conditions prior to European settlement and is referred to frequently throughout this section.

Historically, native insects and pathogens played a significant role as disturbance agents. They can open canopies enough to provide regeneration opportunities for shade-intolerant tree species (such as larch and ponderosa pine), but they also allow shade-tolerant understory tree species (such as Douglas-fir and grand fir) to take over these sites. Insects and pathogens are a natural and essential part of functioning ecosystems and have played a role in shaping the forests of north Idaho. For the most part they attack and colonize vegetation that is stressed or has low vigor, benefiting forest ecosystems, genetic diversity, decomposition rates, and nutrient cycles (Harvey et al. 1994).

Human influences have affected the forests in and around the Boulder Creek area for centuries. Native Americans used fire to manage forests for many centuries prior to European settlement (Yazzie 2007). It is very likely that the Lower Kootenai Indians and other early inhabitants of this area used fire for vegetation management. Barrett and Arno (1982) found that mean fire intervals were shorter near Indian-use zones, suggesting that Indians used fire for various purposes. The research done by Barrett and Arno included both the Upper and Lower Kootenai Indians.

Post-European Settlement

Since European settlement in the area, the landscape has undergone substantial changes. Three main factors have contributed to these changes: fire suppression, past logging practices, and white pine blister rust fungus (Zack 1995). The final main factor that has contributed to substantial landscape change is the white pine blister rust fungus. This fungal disease was first introduced in western North America from Europe in 1910 on Vancouver Island, British Columbia (Hagle and others1989), and soon spread throughout the west. This fungus has killed, and is continuing to kill white pine trees, from seedlings to old growth veterans, not only in the BCRP, but also throughout its range.

Aggressive wildfire suppression has been the standard policy on public land since the 1930s. Firefighting effectiveness increased in the 1940s and the 1950s with additional fire suppression dollars, which allowed for the increased use of trained firefighting crews, smokejumpers, airplanes, helicopters, and bulldozers (Clark and Sampson 1995). This efficiency of fire suppression changed the structure and species composition of many western forests, altering their susceptibility to fire (Tappeiner and others 2007).

Table 3. Timber Sales within the BCRP (Harvest Acres)

SALE NAME	YEAR	EVEN-AGE	TWO-AGE	UNEVEN-AGES	INTERMEDIATE	TOTAL
Unknown	1957-1991	575			739	1313
East Fork Boulder	1983-1988	310			466	776
Ally N Fallen Haul	1993				141	141
Black Cone	1985-1987	93				93
Black Cone Area Salvage	1988				65	65
Boulder Over Salvage	1987-1988	232	73		337	642
Boulder Cedar Pole	1986				33	33
Boulder Lodge	1986	28				28
Broundwood	1997				160	160
Gable Creek	1985-1988	513			298	811
Gable McGinty	1999-2000	84	62		541	687
Hall Mtn. Add On	1999				2	2
Ice Creamed Salvage	1998				80	80
John Crown	1988	38				38
Johnny White Pine	1989	69				69
Katamount	1999-2000		58			58
Katka Peak	1996-2001	112	80	158	205	555
Katamount Units 2-3-S	2001				23	23
Knobby Pine	2000				158	158
Leonia	2013	327	12	76		415
M Billingsly GR	2003				2	2
McFeeline	2002		25		108	133
McGinty OSR	1996				19	19
North Creek Road	1998				13	13
North Creek Road 2	1998				19	19
North Creek	1990-1993	551				551
Poleder	1999		13		134	147
Pouch 6 Salvage	1997				10	10
Pouch Blowtato	1998				108	108
Pouch Creek	1990-1993	207			54	261
Sawlogs One	1998				2	2
Sawlogs Two	1998				2	2
Totals		**3139**	**323**	**234**	**3719**	**7414**

Regulated timber harvest on Federal lands in the BCRP area began in the early 1970s and continued into the present.

Forest Habitat Types

Northern Idaho's forests present a complex array of composition and structure. Cooper et al (1991) distinguished forty six habitat types (potential climax community types) containing numerous conifer species, various hardwoods, and a multitude of shrubs in Idaho north of the Salmon River. These forests are dynamic as well as diverse. They vary constantly in response to climatic changes, geological events, species immigration, and patterns of human use (Johnson and others 1994).

The following forest types are unique in some way. They are the primary forest habitat types represented within the project area. These forest types are based mostly on their similarities in forest character, climate and moisture regimes, and natural disturbance processes (primarily fire).

Moist Forests

Moist forest types represent approximately 40% of the forested area within the BCRP area. About 70% of the proposed treatment units are in the moist forest type.

Moist forests are the most common forest type on mid-elevation sites in the mountains of the northern Idaho panhandle. These forests are dominated by a mixture of conifer species (western red cedar, western hemlock, western larch, Douglas-fir, grand fir, western white pine, lodgepole pine). Declines in long-lived seral species (western larch and white pine) have occurred throughout the Kootenai River sub-basin and the BCRP area. Prior to the introduction of blister rust, when white pine was a dominant species, this was known as the "white pine type." Currently, less than 1% of the project area is composed of stands where white pine is the dominant overstory tree.

Moist forests are very productive and, prior to European settlement, tended to accumulate large amounts of biomass[5] in the relatively long intervals (average of 200 or more years) between stand-replacing fires. Sometimes, low-severity fire occurred two to three times as often as either moderate- or high-severity fire (Smith and Fischer 1997). Because intervals between severe fires were generally long in these forest types before European settlement, the effects of fire exclusion due to fire suppression are subtle. However, the lack of low- and mixed-severity fires over the past 100 years has reduced ecological diversity and increased homogeneity (stands of similar size, age, species composition, structure, etc.) across the landscape (Smith and Fischer 1997). This lack of diversity poses a threat to the long-term resiliency of these forest types as it places them at increased risk over time to disturbances from insects, disease, and severe fire. Specifically, species such as white pine and larch will continue to decline as forest succession would continue to favor climax species such Douglas-fir, grand fir, western hemlock, and subalpine fir, which are more susceptible to these disturbances. Additionally, the long-term prospects for additional old growth recruitment would be somewhat diminished in a landscape where the corresponding risk of large-scale disturbance increases over time.

Dry Forests

Currently, dry forest types represent approximately 12% of the forested area within the BCRP, but represent only about 15% of the proposed treatment acres. Dry forest types consist primarily of ponderosa pine, western larch, and Douglas-fir with a sparse grass and shrub understory and thickets of Douglas-fir regeneration (figure 5). The dry forest type contains the ponderosa pine / Douglas-fir type of old growth stands that are valuable wildlife habitat.

Before Euro-American settlement, dry ponderosa pine and mixed conifer forests of the Inland Northwest were burned by frequent low- or mixed-severity fires. These fires, which burned mostly on the forest floor, maintained low and variable tree densities, light and patchy ground fuels, and simplified forest

[5] The collection of all the living vegetation in a forest.

structure. Trees such as ponderosa pine typically survived these fires with their thick bark. The frequent fires also maintained a forest structure with several age classes that were typically dominated by large, old trees (Arno and others 1995). Fire-tolerant species such as ponderosa pine have been widely replaced by fire-intolerant species such as grand fir, white fir, and small diameter Douglas-fir (Hessburg and others 2005). Proposed treatments provide an opportunity to improve resilience through maintenance, or increases stocking levels of larch and ponderosa pine and improved structure through silvicultural treatments that reduce stand density and therefore increase stand resilience.

Cold-Dry Forest Types

These forests account for roughly 38% of the BCRP forested landscape and about 13% of the proposed treatment acres. Cold-dry forests are located at higher elevations and are characterized by harsher and more restrictive growing environments. Consequently, the forest canopy is partially open in many mature stands. Older stands are dominated by subalpine fir. Younger stands are dominated by lodgepole pine or by a mixture of lodgepole pine, Engelmann spruce, and Douglas-fir. Western larch, grand fir, and western white pine are less prevalent. At higher elevations, lodgepole pine, subalpine fir and scattered whitebark pine are the most common species. Historically, stand-replacing fires occurred at average intervals ranging from 52 to 200 years or more with low-severity and mixed-severity fires occurring every 30 to 50 years on average (Smith and Fischer 1997). Stand-replacing fires generally occurred less frequently at high elevations than at low elevations because of slower tree growth and less flammable vegetation and dead material at high elevations (Smith and Fischer 1997). Proposed treatments provide an opportunity to improve resilience through maintenance, or increases stocking levels of larch and Engelmann spruce.

Forest Composition

Forest composition refers to the assemblage of species that make up a stand. The composition of a forest will change over time due to disturbance and succession. Historically, fire was the primary disturbance process that determined forest composition in most of the northern Rockies (Hessburg and Agee 2003). Since fire has essentially been removed from the ecosystem for approximately 100 years, forest composition has been determined mostly by fire suppression and timber harvest. As a result, important changes in forest composition have occurred in the BCRP area as displayed in figure 4. The most dramatic changes have occurred with respect to long-lived seral species, western white pine, ponderosa pine, and western larch. These species have been replaced across the landscape by more shade-tolerant climax species, Douglas-fir, grand fir, western red cedar, and western hemlock.

Forest composition in the BCRP has changed since the relative success of fire suppression in the project area. Today, nearly 30 percent of the project area landscape is composed of mature forests dominated by Douglas-fir, grand fir, western hemlock, and lodgepole pine; species that have replaced white pine, ponderosa pine and larch. These stands, which historically would have had fewer of these species due to wildfires, have very little structural diversity and are at higher risk of succumbing to insect and disease infestations because of congested stand conditions and competition for light, water and nutrients.

Most of the 15,000 acres of lodgepole pine stands (37%) of the BCRP (figure 4) regenerated after the 1910 fires are now considered a high hazard for bark beetle attacks because they are mature, growing in crowded condition and therefore often stressed due to inter-tree competition for nutrients, water and sunlight, a trend that is expected to continue in the near future without active management. For these reasons and risks to the forest stands, we want to maintain and improve forest landscape resiliency by providing for tree species, stocking levels, and landscape patterns that better resist insects, disease, and stand-replacing wildfire(s).

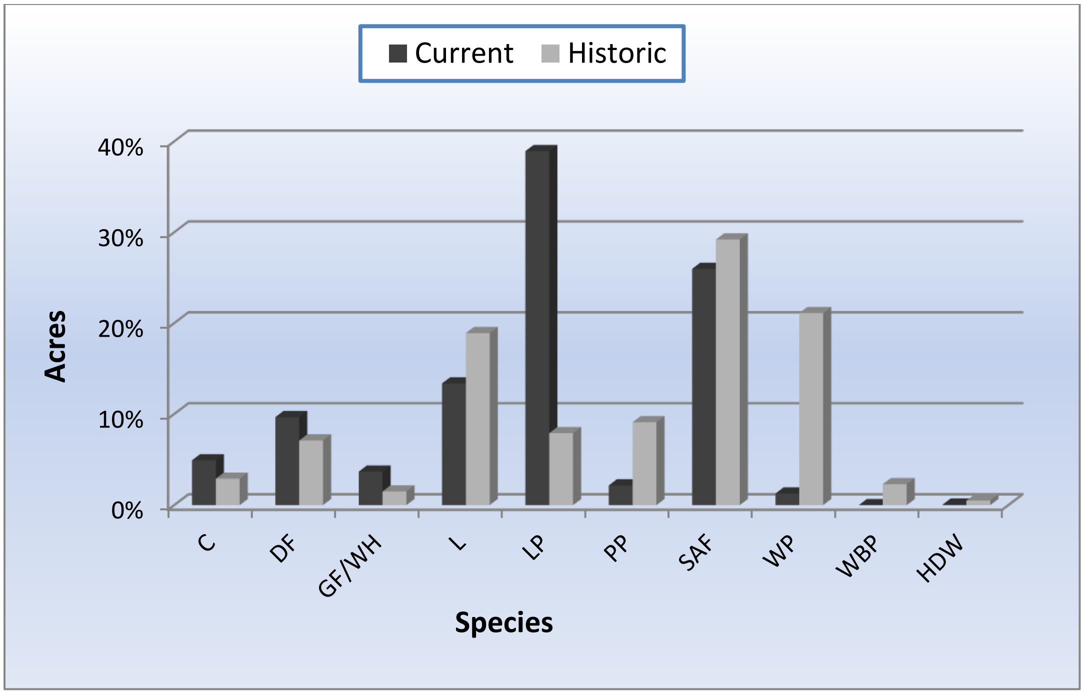


Figure 4. Forest composition within the Boulder Creek Restoration project area.

Species Key:

C – Western red cedar

DF – Douglas-fir

GF – Grand fir

WH – Western hemlock

L – Larch

LP – Lodgepole pine

PP – Ponderosa pine

SAF – Sub alpine fir

WP – White pine

WBP - Whitebark pine

HDW – Hardwoods such as Aspen, Birch and Cottonwood.

Changes to White Pine Stands

Blister rust has taken its toll on western white pine throughout north Idaho and certainly within the BCRP area. Prior to the introduction of blister rust, white pine was a major species on an estimated 21% of the forests in Kootenai sub basin. This exotic disease has been the primary cause for the loss of over 90% of the white pine in north Idaho (Neuenschwander and others 1999). Although more than one half of the forested acres (mostly moist forest types) are capable of supporting substantial populations, western white pine currently is a major species on 1% of the area. In these few areas where white pine currently is the dominant species, it is a direct result of regeneration harvesting that featured white pine reforestation through even-aged silviculture.

Today, shade-tolerant species such as Douglas-fir, grand fir, western hemlock, and western red cedar dominate areas most areas where western white pine once thrived. These changes in forest composition have some potentially significant effects in today's forests. Conversion of tall, well-spaced white pine to low, densely stocked fir results in hazardous fuel ladders that were not present in this forest type historically. Thus, significant changes in fire behavior have become characteristic of modern-day, moist interior forests. Such changes in fire behavior threaten future fire control and place neighboring forest ecosystems at risk (Harvey 1994).

Decline in Whitebark Pine Stands

Much like the Western White Pine, whitebark pine is also susceptible to blister rust. This disease along with bark beetles have killed thousands of whitebark pine throughout north Idaho and within the BCRP area. Prior to the introduction of blister rust, whitebark pine was a common species in rocky high elevation forest types. Along with fire suppression, species such as subalpine fir and lodgepole are outcompeting whitebark pine. These changes in forest composition have negative effects because the whitebark pine seeds are an important food source for wildlife. The proposed action would use prescribed fire to kill the encroaching fir and lodgepole trees in stands adjacent to whitebark pine trees and create open areas favorable for the whitebark pine to regenerate in.

Changes to Dry Forest Types – Ponderosa Pine / Douglas-fir

Changes have occurred in dry forest types and impacted their resilience to drought, insect/disease outbreaks and fire. Historically, ponderosa pine was the dominant species on about 9% of the forests (predominantly on dry sites) in the Kootenai River sub basin. In the BCRP area, ponderosa pine is the dominant species on slightly more than 2% (about 900 acres) of the area, although the proportion of forested area capable of supporting ponderosa pine is slightly higher than the Kootenai River sub basin as a whole. Species such as Douglas-fir were certainly a part of the landscape, but the current levels (10%) are above the estimated historic sub basin levels (7%). Recurrent low-intensity fires before European settlement helped regulate tree competition for limited site resources (such as water and nutrients) by killing tree species that do not typically survive fires. With the effective suppression of underburning type fires in the past 100 years, dry forests have become crowded and overstocked, and are exceeding their moisture-limited potential and overall ecological stability.

Figure 5. Current conditions in a congested ponderosa pine and Douglas-fir old growth stand.

Figure 6. Local dry site old growth stand after a restoration treatments (harvesting and underburning) have been completed.

The congested understory trees have been removed and the larger trees were retained. Prescribed burning effectively reduced the fuels and caused the brush to resprout and become more palatable for big game. The large old growth trees were not harvested, and this stand still meets old growth criteria. With fewer trees per acre competing for limited resources, this treated old growth stand has an increased resilience to future drought conditions, insects, diseases and wildfire(s).

Changes to Western Larch

Western larch was the major forest species on an estimated 19% of the forested landscape in the Kootenai sub basin. Although this species occurs mostly on moist forest types, some dry forest, cool-moist, and cold dry forest types are capable of supporting western larch. Currently, western larch is the major species on about 11% (about 4,550 acres) of the forests in the BCRP area. About 8% of the acres where larch is currently the dominant species is a direct result of past regeneration harvests that featured reforestation of this species. Other stands where western larch currently is the dominant species in the overstory were likely the result of the stand-replacing fires that burned in the late 19th and early 20th centuries. This is consistent with ecology of western larch.

Decline in Aspen Stands

Forest, range, and wildlife managers in the western United States have documented a 50 to 96% decline in total aspen forest acreage since European settlement (Bartos 2001). Data from the Forest Service's Forest Inventory and Analysis (FIA) unit in Ogden, Utah suggest aspen acreages within Montana and Idaho are down 64% and 61%, respectively, since settlement (Bartos 2001).

Aspen stand health has also shown declines since the 1970s. Two primary forces are most commonly cited as contributing to this decline: changes in fire regimes since European settlement and heavy browsing by animals such as deer, elk, and cattle leading to a decline in new sprouts and growth (Romme and others 1995, Kay 1997, Bartos and Campbell 1998). More recently, severe and rapid death and decline of aspen in Colorado, as well as Alberta, Saskatchewan, and Manitoba, Canada have been tied to drought (Hogg et al. 2008, Worrall et al. 2008). Forest diseases and insects are often notable as potential contributing or inciting factors (Frey et al. 2004) but play a largely undefined role in the decline of aspen.

Aspen stands in the project area are a somewhat unique landscape feature and where they do occur they are generally in decline as described above. The proposed action provides an opportunity to maintain and increase the percentage of aspen through harvesting and/or using prescribed fire to kill competing conifers, which would improve the overall species diversity, and contribute toward landscape resiliency.

Figure 7. Aspen stand above Boulder Meadows.

Forest Structure

Forest structure is the horizontal and vertical distribution of layers in a forest. Structure looks at the proportion of young, mature, and old trees across the landscape.

As stated previously, prior to European settlement fire was the primary ecological process that shaped forest structure. Fires served to break the landscape into various forested characteristics over time. For this analysis, the forested landscape was broken into the following structural classifications:

1) openings (which, includes the classes of brush, seedling, and sapling),

2) pole/small timber,

3) mature/large timber, and

4) old growth.

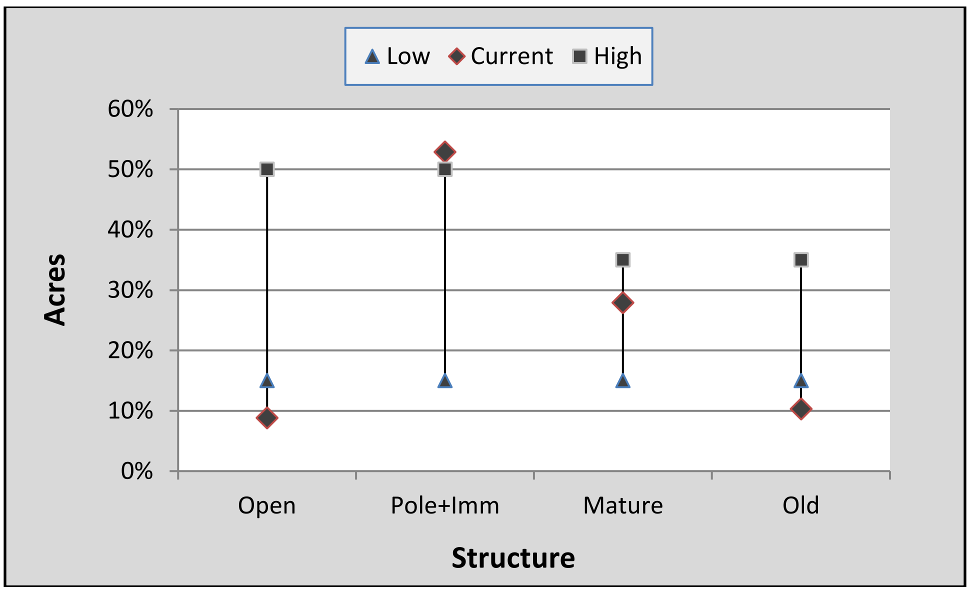


Figure 8. Forest structure within the BCRP area compared to historical Kootenai sub basin averages.

- The chart (figure 7) shows that openings in the forest canopy currently occupy only 9 percent of the project area. This is below the sub-basin range of 15 to 50 percent of the landscape.
- Young forests (Pole and Immature) are currently 53 percent of project area. This number is slightly above historic sub-basin upper range of 50 percent.
- Mature forests are currently within the historic range at 28 percent.
- Old growth currently comprises 10 percent of the landscape which is outside and below the historic range of 15 to 35 percent.

Forest openings compose about 9% of the project area and are below the Kootenai sub basin range of 15 to 50 percent of the landscape. Historically, stand-replacing fire was the primary ecosystem process responsible for creating forest openings. In the age of successful fire suppression, even-aged silvicultural systems have been the primary mechanism for creating forest openings. However, these openings were generally limited to less than 40 acres due to requirements in the National Forest Management Act

(NFMA) that place limitations on the size of openings created through even-aged timber harvest. Based on a patch size analysis of historic data in the BCRP (~40, 600 acres) average patch size was close to 300 acres, with the largest patch being more than 700 acres (Project File). Given the 115-year gap between the last major stand-replacing fire and the advent of regulated timber harvest (1970s), it is not surprising that the combination of pole, immature, and mature forest comprise over 80% of the landscape and forested openings are below the lower end of the historical range of variability.

With fire basically removed from the BCRP ecosystem for nearly a century, fire suppression and timber harvest have shaped the current forest structure. Old growth forests total only about 9% of the total forested acreage in the BCRP, which is outside the historical range of variability and below the lower end of the range (15-35%) at the Kootenai sub basin level.

Although some old growth stands may been harvested using even-aged regeneration systems prior to implementation of the current forest plan, a considerable portion of the mature forests have simply not become old enough to be considered old growth or they were burned up in the extensive fires in the late 1800s and 1910 (see figure 3).

Because the BCRP landscape is in the lower ranges for old growth coverage in the Kootenai sub basin, many of the mature forest stands would be underburned or passively managed so they can trend towards old growth stand composition and structure where needed in the BCRP for various resource benefits on the landscape such as wildlife habitat.

Environmental Consequences

Alternative 1 – No Action

By definition, direct and indirect effects (40 CFR 1508.8), and cumulative effects (40 CFR 1508.7) result from the proposed action, and thus are not relevant to the no action alternative, however current trends related to forest vegetation would likely continue over time and the forest vegetation composition and structure would likely deviate further from desirable conditions. Forest vegetation communities are not static but dynamic, they continue to change through growth and mortality over time and are affected by disturbance agents such as drought, insects, disease or wildfires. The No Action alternative is useful for the reader to use as a baseline in order to compare effects of the action alternative(s) and understand the trade-offs of not taking any management action.

The indirect effects of Alternative 1 would be a continued reduction in the percentage of long-lived seral species across the landscape and an increase in the percentage of shade-tolerant species on all forest types. Without active management, the forest vegetation composition and structure in project area will continue trending away from desired conditions (figure 5 and figure 6).

In lodgepole pine forests, species composition would trend toward dominance of Douglas-fir, grand-fir, cedar, hemlock, and subalpine fir would (Smith and Fischer 1997) as mature lodgepole succumbs to pine beetle and other natural disturbances such as wind. Additionally, throughout its life cycle lodgepole pine is subject to a wide variety of injurious agents (Baumgartner et al 1985). Among the destructive agents are numerous fungi, insects, animals large and small, parasites, fires, air pollution, strong winds and extreme temperatures (Burdick et al 1996). Commonly these forces work together, creating synergistic effects and magnifying damage. Without action, lodgepole pine in the project area will continue to age, decrease in vigor and increase in susceptibility to mountain pine beetle attack. When these trees die, they will become wildland fuels and can contribute to fire severity.

In mixed conifer stands, there would be a continued decrease in the percent composition of western white pine, western larch and ponderosa pine and an increase in species such as Douglas-fir and grand fir that are more susceptible to insect and disease problems than pine and larch. Harvey and others (1994) state that with continued overcrowding of Douglas-fir and grand fir, the competition for water and nutrients would increase, ultimately increasing the susceptibility of these forests to lethal fires and losses in productivity.

An overall trend is that the dominant overstory canopies are declining as trees die and stocking of vigorous, potentially long-lived western larch, western white pine, whitebark pine and ponderosa pine are generally lacking. The deterioration of the overstory has stimulated the development of a predominately shade-tolerant understory of fir species, cedar and hemlock (shade tolerant species) (figure 4).

As outlined in the ICBEMP, the longer management is deferred, the more the overstories of unmanaged stands will deteriorate in overall health and resilience, and the more shade tolerant development will occur. Larch and lodgepole trees would continue to grow in height. However, due to stand density conditions and increasing competition from the shade tolerant stand components, the crown and diameter growth of the larch and lodgepole would continue to decline. Over time, this unbalanced growth would result in increasing height to diameter ratios and decreasing crown ratios. The western larch and lodgepole pine would continue to thin themselves out both as groups and individuals which would contribute to a build-up of ladder fuels and surface fuels. This congested understory along with current and projected overstory mortality tends to form fuel arrangements that are conducive to crown fire development and high severity fires (see fire and fuels report).

Western larch is considered extremely intolerant of shade. Although this species will tolerate some shade the first year or two following establishment, usually it will not survive heavy shading after that (Schmidt and Shearer 1995). Western larch has to be kept in a dominant position, growing taller than the surrounding trees or with a lot of space around it to flourish. If larch becomes overtopped by other trees it will slow in growth and usually die (Schmidt and Shearer 1995). Without either natural thinning (fire or pathogen-caused) or managed thinning, larch would disappear out of most stands sometime in the future and not maintain the ecological role it had prior to Euro-American settlement and fire suppression (Zack 1995). With no action, there would be no thinning or changes in agency fire suppression policies for this area. As a result, the presence of western larch in the project area would depend on the survival of existing larch or regeneration of the species from survivors after stand-replacing fire.

With no action, western white pine and whitebark pine would continue to succumb to blister rust and bark beetles. Without increased patch sizes and forest openings, white pine, whitebark pine, ponderosa pine and larch would fail to regenerate and they would eventually become less common in in the project area. This shift in stand composition to more shade-tolerant, fire-sensitive species, predominantly grand fir, Douglas-fir and hemlock, would also increase the risk and extent of loss from fire. As these species increase as a percent of stand composition, the risk of losing entire stands to wildfire increases greatly (see fire and fuels report).

Ponderosa pine, like western larch, is shade-intolerant and relatively fire-resistant. Again, in the absence of disturbance agents, the more shade-tolerant species, especially Douglas-fir and grand fir, would continue to develop and compete with the ponderosa pine as it does with western larch. Douglas-fir and grand fir also tend to use up more nutrients like potassium, which plays a critical role in forest health. Ponderosa pine and western larch accumulate fewer nutrients in their foliage leaving more available in the soil (Moore 1994). Given that these dry sites already have a limited supply of moisture and nutrients, increased amounts of Douglas-fir and grand fir growing on them would further limit their productivity. Competition for growing space from the more shade-tolerant species is expected to decrease the growth and vigor of the ponderosa pine in these stands. Ponderosa pine, where it exists, would be reduced or potentially eliminated from these stands.

In the absence of a major disturbance, the current stand overstories would continue to decline and western redcedar, hemlock and grand fir come to dominate the project area. Stand density would increase as this cohort expands, resulting in reduced individual tree vigor and a corresponding increase in the risk of insect and disease depredation. This progression would result in the continued build-up of ladder fuels and surface fuels, increasing the risk of an uncontrollable fire with severe effects (see fire and fuels report). Western white pine and whitebark pine would not be regenerated to desired levels across the project area. As time passes, the stands in the project area would deviate further from desired forest conditions.

If a large wildfire were to burn in the project area, the effects on forest composition and structure would be varied. If the fire does not burn hot enough to damage the soil productivity, then the openings created by the fire could be regenerated with desirable tree species and this could help trend the forest to more desirable conditions. However, when burning in dry conditions, these high severity wildfires tend to consume the organic duff layer, damage the soil productivity and have negative effects on the rate of tree regeneration and its growth, or kill old growth stands or individual trees in stands that have old growth characteristics. In regard to fire suppression, if fires are suppressed that would otherwise have burned with low to moderate intensities, then the effects of suppressing them on forest health may have been negative. Depending upon the specific conditions, those type of fires could have favored the desirable species that are in short supply on the landscape (such as ponderosa pine, larch, whitebark pine and white pine) and killed the less desirable species (lodgepole pine, hemlock, grand fir, etc.), and those fires could have reduced the surface fuels (at least temporarily, until the trees that were killed by the fire fell down). However, if fire suppression activities were responsible for extinguishing a wildfire that would have otherwise developed into an intense, large fire, then as discussed above, undesirable effects to forest health may have resulted.

In a discussion of the comparative nature of replacement forests in the western white pine type, Harvey and others (2008) state: “The potential, and perhaps ultimate outcome, is a forest dominated by species with high nutrient demands where nutrient storage and cycling rates are increasingly depressed. This will likely lead to ever increasing stress, with associated endemic insect and pathogen activities creating a domino effect that destabilizes the ecosystem (for example, excessive mortality and more frequent fire). The destabilized ecosystems exhibit inappropriate sensitivity and long-term damage from the same disturbances that once created a highly productive and stable forest ecosystem that was well adapted to both the characteristic long fire cycles and the activities of native insects and pathogens.”

Alternative 2 (Proposed Action) and Alternative 3 (No Activities in Roadless Areas)

Both alternatives 2 and 3 would trend the vegetation in the project area towards desired conditions in the forest plan and improve the overall forest composition and structure in the project area using commercial timber harvest and prescribed burning. Each alternative would accomplish these measures by varying degrees because alternative 2 treats vegetation in the roadless areas while alternative 3 does not.

The BCRP environmental assessment (EA) contains detailed descriptions of alternative development acres of treatments and maps. Definitions of the proposed silvicultural prescriptions are listed in Table 9 of this document. The following proposed action components are relevant to the vegetation discussion and issue indicators.

Alternative 2 – The proposed action, includes about 3,433 acres of commercial vegetation treatments, 806 acres of precommercial thinning and a 22 acre fuel break by Black Mountain Lookout. Alternative 2 also proposes about 7, 407 acres of prescribed burning in the Katka Peak and Mt. Willard-Lake Estelle roadless areas.

Prescribed burning in the Katka Peak roadless area would include opportunities to reduce fuels / improve stand composition and structure in about 118 acres of ponderosa pine / Douglas-fir old growth stands. To lower the risk of prescribed fire related mortality to old growth trees in the stands, slashing the saplings (ladder fuels) out from under and around the old growth trees with chainsaws would need to occur in these stands before successful prescribed burning operations could take place.

Prescribed burning in the Katka Peak roadless area would create about 213 acres of potential whitebark pine habitat or places for whitebark pine to naturally regenerate in. Larger seed producing whitebark pine are located just outside the proposed burn areas and are expected to provide the seed for the new whitebark pine stands. No slashing around the scattered whitebark pines is proposed because most of the trees are growing in grassy areas with low fuels loading. Regenerating the whitebark pine would take place through natural dispersion with birds planting seeds in caches and possibly with crews planting trees and or seeds as budgets allow. Prescribed burning in the Mt. Willard-Lake Estelle roadless area would create about 545 acres of potential whitebark pine habitat for natural regeneration as well. About 23 acres of potential whitebark pine habitat are located outside but adjacent to the Katka Peak roadless area. Refer to maps in the EA for whitebark pine habitat distribution and prescribed burning areas.

These various vegetation treatments are designed to trend the vegetation communities in the project area toward desired conditions and provide for forest composition, structure and pattern that are more resilient and resistant to disturbance such as wildfire, insects and diseases while making forest products available for utilization. Specific vegetation treatments were prescribed to stands using a step-down diagnosis with the intent that the most effective treatment be utilized to close the gap between existing stand conditions and desired stand conditions.

Alternative 3 – **<u>proposes the same</u>** 3,433 acres of commercial vegetation treatments, 806 acres of precommercial thinning and 22 acre fuel break located by Black Mountain lookout tower as listed in alternative 2.

Alternative 3 does **<u>not</u>** propose any commercial harvesting or prescribed burning activity in either the Katka Peak or Mt. Willard-Lake Estelle roadless areas and proposes about 172 acres of prescribed burning treatments outside of the roadless areas. As with alternative 2, these various vegetation treatments are designed to provide for forest composition, structure and pattern that are more resilient and resistant to disturbance such as wildfire, insects and diseases while making forest products available for utilization. Specific vegetation treatments were prescribed to stands using a step-down diagnosis with the intent that the most effective treatment be utilized to close the gap between existing stand conditions and desired stand conditions.

Table 4. Alternatives 2 and 3 as compared to desired conditions.

Total Acres in project area - 40,613	**Alt. 2**	**% Total Acres**	**Alt. 3**	**% Total Acres**
Commercial Vegetation Harvest	3433	8%	3433	8%
Pre commercial Thinning	806	2%	806	2%
Fuel Break	22	Trace	22	Trace
Prescribed Burning	7407	18%	172	0.1%
Acres or (%) trended toward desired conditions	**11,668**	**29%**	**4,433**	**11%**
Principle Issue Indicators **Forest Composition -** Acres trended toward dominance of long-lived seral species (i.e., ponderosa pine, western larch, whitebark pine and western white pine) that better resist insects and disease.	**11,668**	**29%**	**4,433**	**11%**
Forest Structure – Acres of moderate and high hazard lodgepole stands converted to early successional forests.	**1,137 (harvest)** **4300 (Rx fire)**	**3%** **11%**	**75** **0**	**Trace** **0%**
Acres of health, vigor and resilience improved, or maintained, through stocking control.	**11,668**	**29%**	**4,433**	**11%**
Existing plus proposed increased patch size of forest openings (seedling/sapling).	**9268**	**22%**	**6799**	**16%**

Maintenance and restoration of dry-site old growth stands. Total acres of old growth stands in project area is 4,164 acres.	**118 (harvest / Rx fire)** **172 (Rx fire only)**	**3%** **4%**	**118 (harvest / Rx fire)** **0**	**3%** **0%**

The main difference between action alternatives is that alternative 2 would trend about *29%* of the vegetation component toward desired conditions and alternative 3 would trend about *11%* of the project area respectively. This shift in vegetation cover types and successional stages would more closely reflect historic vegetative conditions, and increase the overall ecosystem resilience to future disturbances.

With alternative 2, the effects of the prescribed burning treatments (7,407 acres) would act to restore fire as an ecological process and trend the forest stands across the landscape toward desired conditions. The prescribed fire objectives are listed in the fire and fuels report and they would reduce stand densities, create a mosaic of openings and clear out shade-tolerant ingrowth serving to increase resilience, reduce wildfire hazard and improve forage opportunities for big game.

The prescribed burns in alternative 2 would reduce the amount of moderate and high hazard lodgepole pine forest type in the project area by about 4300 acres and alternative 3 would reduce the amount by about 75 acres. The openings created by the prescribed burning activities are expected to be a mosaic of shapes and sizes. The assumption is that about a third of the lodgepole type stands treated with prescribed fire would be converted to an opening (see fire and fuels report). In areas of pure lodgepole pine stands (about 1500 acres) on Iron and Buck Mountains, regeneration after prescribed burning is expected to be only lodgepole pine, other areas to be burned have scattered larch, ponderosa pine and Douglas-fir overstory trees that are expected to regenerate the area.

Historically, forested openings ranged from 15 to 50 percent of the landscape; today they are at 9 percent. Alternative 2 would increase openings to about 22 percent of the analysis area; alternative 3 would increase them to 14 percent. Average patch size would increase the most with alternative 2. These openings are expected to regenerate with seral plant and tree species such as whitebark pine, larch, aspen and ponderosa pine. Most of the mature lodgepole pine stands in the project area are at an increasing risk of mountain pine beetle attacks (Kegley 2016).

The commercial harvest prescriptions and prescribed burning activities would also increase the abundance of fire-resistant western larch and ponderosa pine, increasing compositional diversity at the project area scale and adding resiliency to future disturbances.

Table 5. Action alternatives and changes in size class.

Size Class	Existing Total (%)	Alt 2 - Total (%)	Alt 2 – Total in BCRP (%)	Alt 3 - Total (%)	Alt 3 – Total in BCRP (%)
Openings/non-forest/ brush	9	+8 (from harvest) +5 (from Rx burning)	22	+8 (from harvest)	14
Pole and Immature	53	-4 (from harvest) -14 (from Rx burning)	35	-4 (from harvest)	49
Mature	28	-4 (from harvest) -2 (from Rx burning)	22	-4 (from harvest)	24
Old Growth	10	0	10	0	10

Currently, there are about 4164 acres (about 10%) of moist site and dry site old growth stands in the **40,613 acre** BCRP area. The proposed prescribed burning activities would maintain and improve resilience in about 118 acres of dry site old growth stands while commercial harvest/underburning would remove ladder fuels and competing smaller trees on about 173 acres for a total of 291 acres treated. The old growth trees would be protected from harvesting and mortality from burning using the harvesting contract and the site specific burn plan respectively. No old growth stands would be removed from old growth status. Alternatives 2 and 3 differ in the amount of acres of old growth treated (Table 4), however, the treatments would have a positive effect on the resilience in dry site old growth stands as defined by (Green and others, 2011), because of the reduced inter-tree competition for resources after treatments are completed. All of the old-growth stands will still meet the requirements post-harvest and underburning. None of the action alternatives would directly reduce the number of acres of current old growth stands.

Following commercial harvest, blister-rust resistant western white pine, larch, and ponderosa pine seedlings would be planted where appropriate following harvest and site preparation in regeneration treatment areas. Planting (artificial regeneration) would allow multiple benefits to be derived from gains that have been made in tree improvement. Planted white pine would have some level of resistance to blister rust (Fins et al 2008, McDonald et al 2004). Deployment of this rust-resistant genetic material is critical to restoring health and vigor to white pine ecosystems (Fins et al 2001). Planted larch and ponderosa pine would be of improved stock, and would likely exhibit increased growth rates relative to naturally regenerated seedlings (Jaquish 1995, Fins and Moore 1984). Most importantly, the establishment of these young white pine, ponderosa pine and larch seedlings would positively affect the species composition at both the stand and project area scale.

Existing desirable species composition would be retained within proposed treatment units and prescribed burning areas. Leave trees would include the largest, healthiest western larch, western white pine and ponderosa pine available, including large snags for wildlife. Whether through harvesting, slashing, or using prescribed fire, removing the smaller and more insect / disease susceptible species of trees that are directly competing for light, nutrients and water would allow the desirable leave trees to improve their vigor and resilience, encourage their future growth, and keep their locally adapted genetics on the landscape as a future seed source.

Coniferous natural regeneration including Douglas-fir, ponderosa pine, Engelmann spruce, western hemlock, lodgepole pine, grand fir, and western redcedar is expected within regeneration treatment areas. Prescribed burning (both alone and following harvest) would further act to rejuvenate fire-adapted, dependent or opportunistic shrub and hardwood species (Arno and Keane 2000, Smith and Fischer 1997, Clark and Sampson 1995). All of this within-stand compositional variability would provide increased resilience to insects, diseases, fire and a potentially changing climate, as well as providing habitat variety for wildlife and contributing to aesthetic variety. Fischer and other (2006) suggest increased landscape heterogeneity is one of the keys to ecosystem resilience.

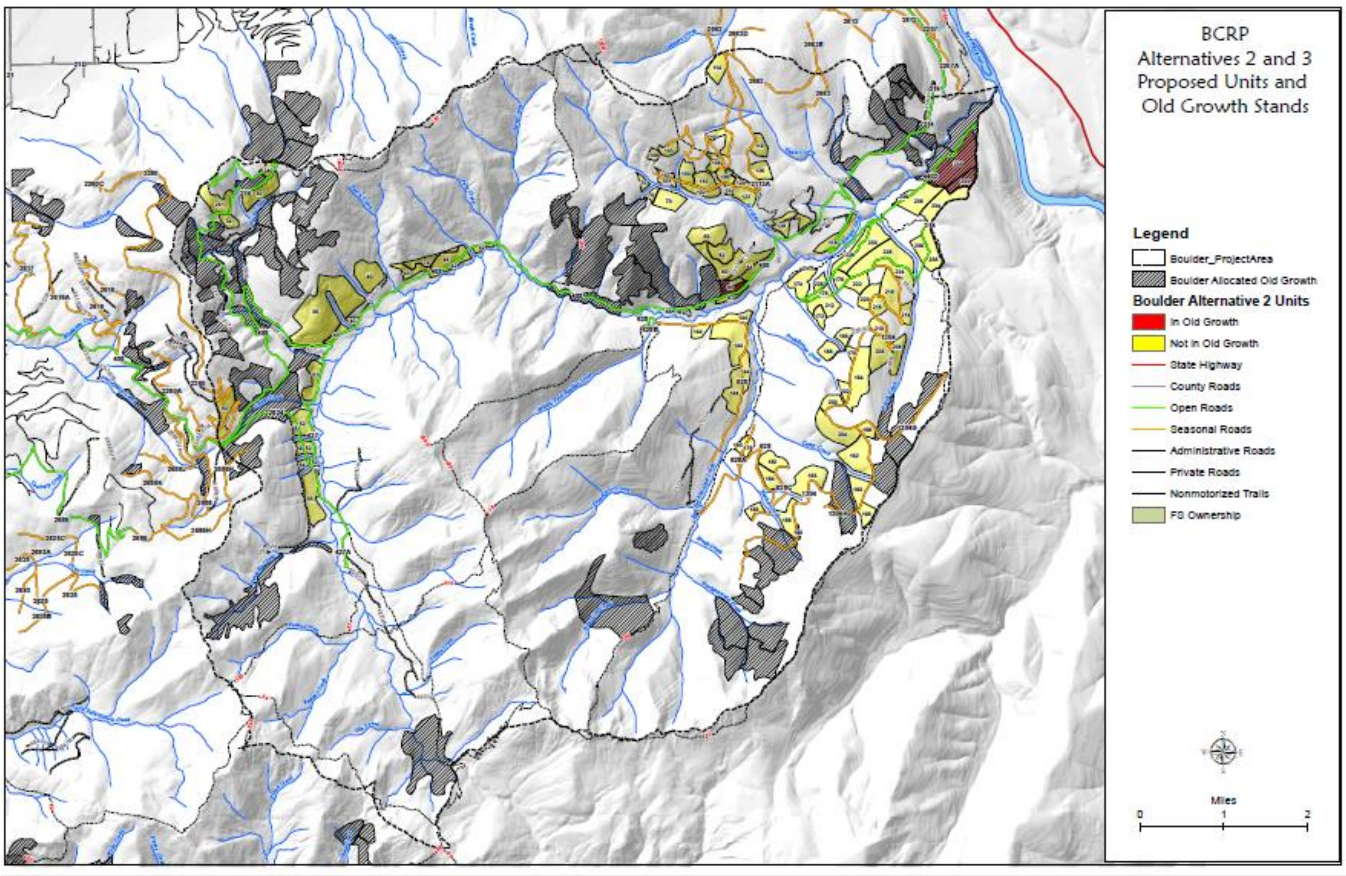
Old Growth

Each old growth stand in the project area was reviewed and measured against the Green and others (1992 - errata corrected 12/2011) standards for the appropriate old growth type code. Table 6describes the minimum criteria, used as a screening device, to select stands that may be suitable for management as old growth in the BCRP area. The stands that meet these criteria are part of the project file. All alternatives comply with the following IPNF old growth standards.

Table 6. Minimum standards for old growth criteria

Forest Type	TPA	Large Tree Size (d.b.h.)	Age of Large Trees (years)	Basal Area (sq. ft./acre)
Douglas-fir	8	21”	> 150 years	40
Grand Fir	10	21”	> 150 years	80
Cedar and Hemlock	10	21”	> 150 years	120
Subalpine fir	10	17”	> 150 years	80

Figure 10. Old growth stands in the BCRP



Both alternatives include 434 acres of a group selection prescription (Table 9). These group selection treatments would improve structure and composition of the residual stand by retaining the largest and most vigorous trees available. A diversity of tree species would be retained, although preference would be given to long-lived seral species (i.e., ponderosa pine and western larch). Average residual stand density would be about 50 trees per acre. However, given variability within the stand, considerable variability is not only expected with these selection treatments, but desirable. Small openings of 1 to 3 acres would be created on about one-quarter to one-third of the treatment stands. Ponderosa pine and western larch would be regenerated in these openings. These openings would not be devoid of residual overstory trees, but would appear much like a shelterwood harvest. The largest available trees, with the best form and vigor, would be retained in these created openings and the residual overstory density would likely range from 10 to 20 trees per acre. In the remaining two-thirds to three-quarters of the treatment area, trees would be thinned from below to reduce canopy base height[6]. Additionally, some crown thinning would occur to further reduce canopy bulk density[7] and crown-to-crown contact. Based on

[6]The height on stem of the tree that represents the bottom of the live crown. In a fire context canopy base height represents the vertical position of canopy fuel that is available to burn.
[7]The bulk property of a group of trees, not of an individual tree. Canopy bulk density is used to predict whether an active crown fire is possible.

implementing similar prescriptions on the ranger district, the within-stand variability could range from as low as 40 trees per acre to over 100 trees per acre in these thinned areas. Based on previous treatments in similar site conditions, the average size of the trees to be removed is expected to be less than 11 inches diameter at breast height (d.b.h).

The 2015 Forest Plan deliberately includes language within two components (FW-DC-VEG-03, FW-GDL-VEG-01) that would allow vegetation management activities to occur within old growth stands **if** the activities were designed to increase the resistance and resiliency of the stands to disturbances or stressors, **and** if the activities would maintain the criteria for age and number of trees and basal area for the specific old growth type as described in Green et al. 1992. Managing forestwide vegetation composition, structure, pattern, and process within HRV (GOAL-VEG-01), including managing to increase old growth habitat, is part of the 2015 Forest Plan's coarse filter framework for providing for species diversity in the plan area (FW-DC-WL-11). Management activities (timber harvesting, road reconstruction, prescribed fire etc.) have the potential to impact old growth habitat or specific components of old growth; such as interior habitat and vertical structure. This is of course beneficial to some species (e.g., flammulated owl) and not beneficial to others and may vary by old growth type; but by increasing the resistance and resiliency of the forest to disturbances, there is an increase in the chances that those stands will persist into the future.

Treatments including precommercial thinning and commercial thinning harvest positively affect forest composition. By selectively removing trees based on a species preference, these treatments would allow composition to be shifted towards species that are in short supply on the landscape relative to historic conditions (western, larch, western white pine, ponderosa pine and aspen).

Indirect effects of improved vegetative diversity including the increased presence of potentially long-lived seral species would be improved resistance to insect and disease pathogens, fire, and climatic variability. It would also enhance the variety of habitat available to wildlife (see wildlife report) and increase the available range of future vegetation management options.

Table 7. Long-lived seral species relative shade tolerance (Minore 1979)

Highest Shade Tolerance		*Lowest Shade Tolerance*
White pine	Ponderosa pine	Western larch

Where they currently exist in the overstory, the most vigorous long-lived seral species would be retained as native seed sources. On dry forest sites this would be ponderosa pine and western larch. On moist sites, cool-moist and cold-dry forest types, white pine and western larch would be retained. Increasing the percentage of these species on the landscape would improve overall ecosystem health by reducing the percentage of Douglas-fir, grand fir, and lodgepole pine, which are more susceptible to insect and disease. Additionally, ponderosa pine and western larch are more resistant to fires than the species they would be replacing (Harvey and others 1994). Finally, developing mixed species plantations would increase the diversity of tree species composition and structure, which helps create forests that are more resilient to ongoing climate-related changes (Hubbard et al. 2007).

Openings Exceeding 40 Acres

Forest Service policy FSM 2470.1 directs land managers to normally limit the size of openings created by even-aged silvicultural methods to 40 acres or less. With some exceptions, creation of larger openings is allowable with Regional Forester authorization. The proposed action includes units that would exceed the 40-acre opening size as displayed in Figure 11. The scoping notice for the BCRP (December 2016) notified the public and solicited feedback related to potential that some of the proposed regeneration units would exceed 40 acres. Regional Forester authorization to exceed 40-acre regeneration openings will occur prior to issuing a decision on this project.

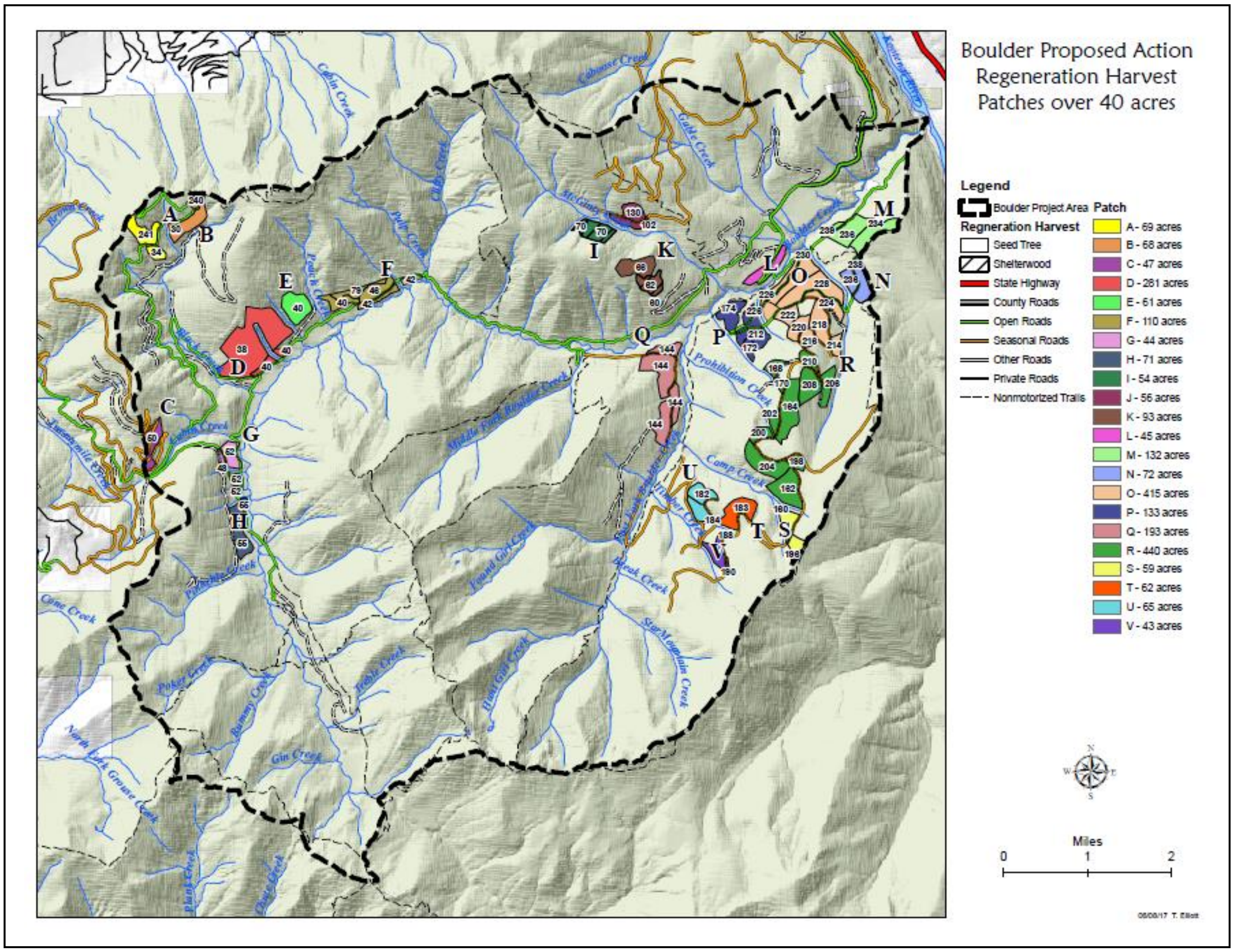
Regenerating relatively large patches of existing medium and large forest structure and converting them to the early successional stage of stand development would increase the mean patch size and mean core area of the early successional stage in the project area. An increase in mean patch size for the early successional stage represents a move towards desired conditions as outlined in the in the IPNF Forest Plan (100 to 300 acre patches with larger ones on steep topography), and towards the historic range of structural distribution at the landscape scale (USDA 2000). Given the mixed-severity fires that formed the sub-basin landscape the estimated historic range of forested openings was quite variable at 15 to 50% (USDA Forest Service 2000b). The proposed even-aged regeneration harvesting for patches over forty acres (Table 8) under alternatives 2 and 3 would increase landscape structural diversity by increasing forest openings by 2, 612 acres. When compared to the BCRP watershed scale of 40,613 acres, the patches amount to a 6% increase within of the BCRP area. Patches of early seral vegetation (even-aged regeneration harvest openings) over 40 acres in size that would be created by the proposed action. These patches would not be entirely open and would contain leave areas of diverse shapes and sizes, see Table 8 and design features in the EA. Creating openings in the BCRP area would help address the purpose and need for this project and trend the area toward desired conditions in the forest plan.

Table 8. Opening over 40 acres.

PATCH	ACRES	UNIT(S)
A	69	34, 241
B	68	30, 240
C	47	50
D	281	38, 40
E	61	40
F	110	40, 42, 76, 79
G	44	48, 52
H	71	55
I	54	70
J	56	102, 130
K	93	62, 66
L	45	116
M	132	234, 236, 239
N	71	236, 238
O	415	176, 214, 216, 218, 220, 222, 224, 226, 228, 230
P	133	172, 174, 176, 212, 226
Q	193	144
R	440	162, 164, 168, 170, 198, 200, 202, 204, 206, 208, 210
S	59	160, 196
T	62	183
U	65	182, 184
V	43	188

PATCH	ACRES	UNIT(S)
Total	2,612	

Figure 11. Openings greater than 40 acres that would occur under Alternative 2 and 3.



Cumulative Effects – Forest Composition and Structure

Excluding future forest fires, none of the other activities listed in the past, present and reasonably foreseeable actions table in the EA would have measureable cumulative impacts on forest vegetation structure and composition. Because the North Zone Roadside Salvage project would only remove dead and dying hazard trees and blow down along selected open National Forest System roads in the project area, the limited area of roadside harvest would affect less than 1% of the stands in the BCRP area. Therefore, none of the past, present or reasonably foreseeable actions listed in Table 6 in the EA would add any measurable cumulative effects to the forest composition or structure components of this project.

Fire suppression has had the greatest impact on forest composition over the past 100 years. In the future, and in the continued absence of fire, forest composition would continue to trend toward Douglas fir, grand fir, western red cedar, western hemlock, and subalpine fir and away from long-lived seral species (i.e., western larch, ponderosa pine, whitebark pine and western white pine) that are typically more resistant to insects and disease and more fire-adapted.

In the absence of fire, past timber harvest has been the primary mechanism affecting changes in forest structure through the conversion of mature stands to forest openings through regeneration harvesting. Both action alternatives, through even-aged regeneration harvesting, would add to the total acreage of forest openings. In the absence of large-scale disturbance such as fire or insect epidemic, portions of the project area not proposed for treatment and currently occupied by small, medium, large and multistoried forest structure would continue to progress in some fashion towards increasingly mature forest structures. These untreated areas would function to link and provide habitat connectivity between existing areas of late-successional stage stand structures, which would increase the patch size of these structures as the untreated areas mature and develop structural complexity over time.

Project Design Features and Mitigation Measures

All project design features are listed in the EA.

Required Monitoring

Monitoring of regeneration success is required by the National Forest Management Act of 1976. The effectiveness of reforestation on the IPNF is detailed in regularly produced in stake row reports (USDA 1996-2015).

Table 9. Silvicultural treatments (acres) proposed with Alternatives 2 and 3.

Silviculture Prescription	Definition	Tree Retention	Regeneration Species	Residual Percent Crown Closure	Alt. 2	Alt. 3
Seed Tree with Reserves	An even-aged regeneration or harvest method that removes trees except those needed for the purposes of seed production. Prepares the seed bed and creates a new age class in an exposed microenvironment in one entry. Additional live trees would be retained for reasons other than regeneration.	<10 TPA plus ¼-3 acres clumps	WP, WL, ES	10-20%	2923	2923
Shelterwood with Reserves	A regeneration harvest method that removes trees except those needed for regeneration and sufficient residual trees needed to meet other resource objectives. Prepares the seed bed and creates a new age class in a moderated microenvironment. This is both the establishment and the final removal harvest since the overwood trees (those needed for regeneration) and the reserves will be retained to create a two-aged stand. Additional live trees would be retained for reasons other than regeneration.	10-15 TPA plus ¼-3 acres clumps	WP, WL, PP	25-40%	127	127
Group Selection	An uneven-aged regeneration method in which trees are cut in small groups of 1-3 acres and new age classes are established. Commercial thinning would occur between the groups. Multiple entries would ultimately result in an uneven-aged stand of 3 or more age classes.	50 TPA **average** (10-20 TPA in openings; 70-130 TPA in thinning matrix)	WP, WL, PP	25-55%	434	434
Precommercial Thin	The cutting of trees not for immediate financial return but to reduce stocking.	200-300 TPA	NA	10-20%	806	806
Prescribed Burn	Manipulation of a site by prescribed burning to enhance the success of natural regeneration.	Variable	Seral species such as PP, L, Aspen.	10-50%	7407	172

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Appendix A – Regulatory Consistency

Land and Resource Management Plan Compliance Standards and Guidelines

The IPNF LRMP (2015) provides standards and guidelines that apply to the BCRP. Each forest vegetation and timber standard and guideline from the Forest plan is listed below. A description of how this project complies follows each standard or guideline.

Standards

FW-STD-VEG-01. Within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the definition of old growth (see glossary for old growth definition).

Compliance:

- All alternatives are consistent with this standard because the vegetation management activities would not likely modify the characteristics of the current old stands to the extent that the stand(s) would no longer meet the definition of old growth.

FW-STD-VEG-02. Within the ancient cedar groves, timber harvest or other vegetation management activities shall not be authorized (exceptions may occur for the treatment of non-native invasive plants, activities needed to address human health and safety issues such as the removal of hazard trees adjacent to a recreation site, or in the circumstance where a natural, unplanned ignition is allowed to burn into a grove under a low intensity).

Compliance:

- Forest plan standard **FW-STD-VEG-02** is not applicable to the BCRP because there are no ancient cedar groves proposed to be treated with this project.

FW-STD-TBR-01. Regulated timber harvest activities shall occur only on those lands classified as suitable for timber production.

Compliance:

- Alternative 1 complies with this standard because it does not propose timber harvest.
- Alternatives 2 and 3 comply with this standard because all lands proposed for timber harvest are suitable timber lands.

FW-STD-TBR-02. If individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, then NFMA requirements regarding public notification and approval shall be followed. These requirements do not apply to the size of areas harvested because of catastrophes such as, but not limited to, wildfire, insect and disease attacks, or wind storms.

Compliance:

- This standard does not apply to alternative 1 because it does not propose even-aged silvicultural practices.

- Alternatives 2 and 3 include even-aged silvicultural practices. The potential for openings in excess of 40 acres was disclosed to the public during the initial project scoping period. The public comment period for this environmental assessment will provide further opportunity for public comment regarding openings in excess of 40 acres. The openings that are expected to exceed 40 acres are discussed in detail in the BCRP - Vegetation Report. Regional Forester approval will be sought in order to follow through with the creation of the proposed openings.

FW-STD-TBR-03. Timber harvest activities shall only be used when there is reasonable assurance of restocking within 5 years after final regeneration harvest. Restocking level is prescribed in a site-specific silviculture prescription for a project treatment unit and is determined to be adequate depending on the objectives and desired conditions for the Plan area. In some instances, such as when lands are harvested to create openings for fuel breaks, wildlife habitat, and vistas or to prevent encroaching trees, it is adequate not to restock.

Compliance:

- This standard does not apply to alternative 1 because it does not propose even-aged silvicultural practices.
- Alternatives 2 and 3 comply with this standard because regeneration harvests are not proposed on sites with potential regeneration success concerns. Overall regeneration success on the Bonners Ferry Ranger District is 96 percent for the period 1976 to 1999, with 79 percent success within 5 years of regeneration harvest (Project File). The 2007-2009 Forest Plan Monitoring and Evaluation Report states, "…it appears that 98 percent of the stands planted in the last 21 years are currently satisfactorily stocked. For the five years since we last reported on restocking, the average satisfactory stocking is 94 percent. And this five year period includes several unusually droughty summers."
- Potential limitations to regeneration concerns would be further assessed continually on an on-the-ground, site-by-site basis within harvest units during unit layout and implementation.

FW-STD-TBR-04. Even-aged stands shall generally have reached or surpassed culmination of mean annual increment (95 percent of CMAI, as measured by cubic volume) prior to regeneration harvest, unless the following conditions have been identified during project development:

- When such harvesting would assist in reducing fire hazard within the WUI; and
- When harvesting of stands will trend landscapes toward vegetation desired conditions.

Compliance:

- Alternative 1 complies because it does not propose timber harvest.
- Alternatives 2 and 3 comply with this standard because the majority of stands proposed for regeneration harvest have met the culmination of mean annual increment (CMAI) requirement. Inclusion of stands or portions of stands that have not reached or surpassed CMAI is intended to increase the amount of seedling/sapling size class and white pine/western larch forest types while decreasing the lodgepole pine, grand fir and hemlock forest types and medium size class. This would trend these measures of forest resilience on the landscape within the project area toward the desired conditions. Stands proposed for regeneration harvest in alternatives 2 and 3 are primarily stocked with lodgepole pine, grand fir and lesser quantities of Douglas-fir. Lodgepole pine stands are increasingly at hazard to mountain pine beetle mortality as trees increase in size

and density. Throughout the project area, Douglas-fir and grand fir stand components are already beginning to decline due to root disease infections and stand examinations indicated signs of root disease are present throughout stands. Growth and yield modeling of the stand data, accounting for effects of root diseases and mountain pine beetle, supports the conclusion that these stands are likely to culminate early.

FW-STD-TBR-05. Harvesting systems shall be selected based on their ability to meet desired conditions and not strictly on their ability to provide the greatest dollar return.

Compliance:

- Alternative 1 complies because it does not propose timber harvest.
- Alternatives 2 and 3 comply with this guideline. All of the proposed harvest prescriptions include substantial quantities of green tree retention in various arrangements. Green tree retention within harvest units reduces revenues because it reduces the timber volume sold and elevates logging costs. Green tree retention contributes to the desired conditions of many other resource values such as wildlife habitat, soil quality, water quality, and visual quality.

FW-STD-TBR-06. Clearcutting shall be used only where it is the optimum method for meeting Forest Plan direction.

Compliance:

- This standard does not apply to the BCRP because no clearcutting is proposed in any alternative.

FW-STD-TBR-07. Even-aged prescriptions other than clearcutting (seed tree, shelterwood, etc.) shall be used when appropriate to meet Forest Plan direction.

Compliance:

- This standard does not apply to alternative 1 because it does not propose even-aged silvicultural practices.
- Alternatives 2 and 3 propose even-aged prescriptions other than clearcutting in order to increase the quantity of seedling/sapling size class and the quantity of western larch, western white pine and ponderosa pine dominance types within the resource area. Increasing these dominance types and the seedling/sapling size class will trend forested ecosystem within the resource area toward the desired conditions listed in the Forest Plan. The seed tree, shelterwood with embedded aggregate retention and irregular selection harvest prescriptions facilitate compliance with a broad host of forest plan standards and guidelines while trending towards the desired conditions for forest structure and dominance types.

Guidelines

FW-GDL-VEG-01. Timber harvest or other vegetation management activities may be authorized in old growth stands if the activities are designed to increase the resistance and resiliency of the stand to disturbances or stressors, and if the activities are not likely to modify stand characteristics to the extent that the stand would no longer meet the definition of old growth (see the glossary for the definitions of resistance and resilience).

Compliance:

- All alternatives are consistent with this guideline because the vegetation management activities would not likely modify the characteristics of the current old stands to the extent that the stand(s) would no longer meet the definition of old growth.

FW-GDL-VEG-02. Road construction (permanent or temporary) or other developments should generally be avoided in old growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances.

Compliance:

- This guideline does not apply to alternative 1 because there are no proposed vegetation management activities.
- Alternatives 2 and 3 comply with this guideline because temporary access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances.

  FW-GDL-VEG-03. Vegetation management activities should retain the amounts of coarse woody debris (including logs) that are displayed in table 3 [of the Forest Plan]. A variety of species, sizes, and decay stages should be retained. Exceptions may occur in areas where a site-specific analysis indicates that leaving the quantities listed in the table would create an unacceptable fire hazard to private property, people, or sensitive natural or historical resources. In addition, exceptions may occur where the minimum quantities listed in the table are not available for retention.

Compliance:

- This guideline does not apply to alternative 1 because there are no proposed vegetation management activities.
- The dispersed and aggregated retention associated with the harvest prescriptions will facilitate compliance with this guideline under alternatives 2and 3.

FW-GDL-VEG-04. Vegetation management activities should retain snags greater than 20 inches DBH and at least the minimum number of snags and live trees (for future snags) that are displayed in table 4 [of the Forest Plan]. Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities.

Compliance:

- This guideline does not apply to alternative 1 because there are no proposed vegetation management activities.
- This guideline will be implemented through the silviculture prescriptions associated with the implementation of each vegetation management activity in alternatives 2 and 3. The dispersed and aggregated retention associated with the harvest prescriptions will also facilitate compliance with this guideline.

FW-GDL-VEG-05. Where vegetation management activities occur and snags (or live trees for future snags) are retained, the following direction should be followed:

- Group snags where possible;

- Retain snags far enough away from roads or other areas open to public access to reduce the potential for removal (generally more than 150 feet);
- Emphasize retention of the largest snags and live trees as well as those species that tend to be the most persistent, such as ponderosa pine, larch, and cedar;
- Favor snags or live trees with existing cavities or evidence of use by woodpeckers or other wildlife

Compliance:

- This guideline does not apply to alternative 1 because there are no proposed vegetation management activities.
- Alternatives 2 and 3 comply with this guideline because all the points of the guideline will be implemented through the silviculture prescriptions associated with the implementation of each vegetation management activity. The dispersed and aggregated retention associated with the harvest prescriptions will also facilitate compliance with this guideline.

FW-GDL-VEG-06. During vegetation management activities (e.g., timber harvest), and in the event that retained snags (or live trees being retained for future snags) fall over or are felled (for safety concerns), they should be left on site to provide coarse woody debris.

Compliance:

- This guideline does not apply to alternative 1 because there are no proposed vegetation management activities.
- Alternatives 2 and 3 comply with this guideline because all the points of the guideline will be implemented through the silviculture prescriptions and contract provisions associated with the implementation of each vegetation management activity.

FW-GDL-VEG-07. Evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for any plant species listed under the Endangered Species Act or on the regional sensitive species list. If needed, based on pre-field review, conduct field surveys and provide mitigation or protection to maintain occurrences or habitats that are important for species sustainability.

Compliance:

- This guideline does not apply to alternative 1 because it includes no proposed management activities.
- Alternatives 2 and 3 comply with this guideline because all potential activity areas were surveyed by the project biologists / botanists and all plant / habitat locations were appropriately buffered.

FW-GDL-VEG-08. All silvicultural practices may be used to manage forest vegetation. This includes silvicultural systems (e.g., even-aged, two-aged or uneven-aged), regeneration methods (e.g., clearcutting, seed-tree, shelterwood, and group or single-tree selection), as well as other practices such as improvement cutting, commercial or pre-commercial thinning, use of planned or unplanned ignitions, planting, pruning, invasive terrestrial plant species control, cone collection, tree improvement, insect or disease control, site-preparation, and fuel reduction. Appropriate practices for a given situation depend on numerous factors, including the current and desired forest vegetation conditions at the stand and landscape scales, the biophysical setting, and the management direction and emphasis for the area. Silvicultural practices should generally trend the forest vegetation towards conditions that are more resistant and resilient to disturbances and stressors, including climate change.

Compliance:

- Alternative 1 does not comply with this guideline because it does not trend the forest vegetation towards more resistant and resilient conditions.
- Alternatives 2 and 3 comply with this guideline because they are designed to improve the health and resilience of the vegetation in the project area. The action alternatives use a wide range of silvicultural practices to improve the resistance of the affected forest vegetation to biotic and abiotic disturbances, including climate change.

FW-GDL-VEG-09. Peatlands/bogs should be buffered by at least 660 feet from management activities that may degrade this habitat.

Compliance:

- This guideline does not apply to alternative 1 because it includes no proposed management activities.
- Alternatives 2 and 3 comply with this guideline because all pertinent wetlands are buffered at least 660’ from any management activities that have the potential to degrade this habitat.

FW-GDL-TBR-01. Timber harvest on other than suitable lands may occur for such purposes as salvage, fuels management, insect and disease mitigation, protection or enhancement of biodiversity or wildlife habitat, or to perform research or administrative studies, or recreation and scenic-resource management consistent with other management direction.

Compliance:

- This guideline does not apply to alternative 1 because it includes no proposed timber harvest.
- Alternatives 2 and 3 comply with this guideline because timber harvest is proposed only on suitable lands.

Management Areas

We have designed the BCRP proposal to achieve direction described in the 2015 IPNF forest plan. The BCRP boundary totals 40,612 acres and overlaps the following different Management Areas (MA’s), specifically MA 2b (Eligible Wild and Scenic River – 35 acres), MA 4a (Hunt Girl Research Natural Area – 1,425 acres), MA 5 (Backcountry Restoration – 23,384 acres), MA 6 (General Forest – 15,717 acres) and also 51 acres of private land.

All of the acreage affected by the proposed action are located within Management Area 5 (MA5) and Management Area 6 (MA6).

MA 5 - Backcountry

Description

Forest wide, approximately 92 percent of this MA is located within inventoried roadless areas (IRA's). This MA is relatively large areas, generally without roads, and provides a variety of motorized and non-motorized recreation opportunities. Trails are the primary improvements constructed and maintained for recreation users. In some areas, lookouts, cabins, or other structures are present as well as some evidence of management activities. The 23,384 acres of MA5 within the BCRP area are located in the Katka Peak – #96, IRA that contains10,300 acres (in Idaho) and Mt. Willard-Lake Estelle #134 - 35,000 acres in Idaho, and 23,400 acres in the Kootenai NF administered in (Idaho), 9,600 Acres Kootenai (Montana) - 68,000 acres total. These areas are classified as backcountry/restoration. Inventoried roadless area, management requirements under 36 CFR 294 Subpart C (inside Idaho) or Subpart B, 66 Fed Reg. 3244-3273 (outside of Idaho) apply.

Desired Conditions

MA5-DC-VEG-01. Natural ecological processes (e.g., plant succession) and disturbances (e.g., fire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation.

MA5-DC-TBR-01. Timber harvest and road construction are limited

Standards

MA5-STD-TBR-01. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.

MA5-STD-TBR-02. If within an Idaho Roadless Area, timber harvest activities shall follow direction contained in 36 CFR 294.24 – Timber cutting, sale, or removal in Idaho Roadless Areas.

MA5-STD-TBR-03. If within an inventoried roadless area outside of Idaho, timber harvest activities shall follow direction found in the 2001 Roadless Rule (36 CFR 294.13.

- These standards do not apply to alternative 1 because it includes no proposed timber harvest.
- Alternatives 2 and 3 comply with these standards because no timber harvest is proposed in areas classified as MA5.

Guidelines

MA5-GDL-TBR-01. If not within an inventoried roadless area, timber harvest is allowed to maintain or restore other resource values.

- This guideline does not apply to alternative 1 because it includes no proposed timber harvest.
- Alternatives 2 and 3 comply with this guideline because no timber harvest is proposed in areas classified as MA5.

MA 6 - General Forest

Description

Most of this Management Area (MA) consists of relatively large areas with roads, trails, and structures, as well as sign of past and ongoing activities designed to actively manage the forest vegetation. This MA provides a wide variety of recreation opportunities, both motorized and non-motorized.

Vegetation and watershed restoration is accomplished predominantly through active management. Evidence of past management activities vary across the landscape, but are generally more noticeable in this MA than others. Many of the acres within this MA are suitable for the production of timber on a regulated basis, providing wood fiber in response to regional and national demand. However, there are other areas within this MA that are not suitable for timber production due to the value they have for other purposes. For example, moist site old growth stands and riparian areas are common within this MA and are not managed for timber production.

Desired Condition

MA6-DC-VEG-01. In much of this M A, vegetation management activities have a dominant role in affecting the composition, structure, and pattern of vegetation. These management activities trend the vegetation towards the desired conditions. Although natural ecological processes and disturbances are still present, they are influenced more by human activity in this MA than in others.

Standards

MA6-STD-TBR-01. On lands suitable for timber production, timber harvest is allowed for the purpose of timber growth and yield while maintaining productive capacity. Timber harvest is scheduled and contributes to the allowable sale quantity.

Compliance:

- This standard does not apply to alternative 1 because it includes no proposed timber harvest.
- Alternatives 2 and 3 comply with this standard because timber harvest is proposed only on suitable lands.

MA6-STD-TBR-02. On lands not suitable for timber production, timber harvest is allowed to meet specific resource objectives other than timber growth and yield. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.

Compliance:

- This standard does not apply to alternative 1 because it includes no proposed timber harvest.
- Alternatives 2 and 3 comply with this standard because timber harvest is proposed only on suitable lands.

Guidelines

There are no guidelines for Vegetation or Timber in MA6.